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Art. IV.—*On the "Clawing" Action of Rain in Sub-Arid Western Australia.*

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(With Plate II.).

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Introduction.

In sub-arid south-central Western Australia, which is portion of the great plateau of that country, erosion presents results different in many ways from those obtained in areas possessing a "normal" climate. This is partly due to the difference in degree, and to some extent in kind, of the erosional agents, and partly to the surface alteration that rocks and soils have in many parts sustained. There are certain minor features which are peculiar to the area, and therefore of interest. Such are the miniature soil-terraces described in this paper, the formation of which is associated with the "clawing" action of rain, and with the gravitational drift of rock debris.

Summary.

The "clawing" action of rain on gentle soil-covered slopes with a firm surface produces terraces with tiny cliffs, which are termed "miniature soil-terraces," and at the same time gradually removes the soil to lower ground. By the formation and recession of these terraces, drifting rock debris is undermined, and topples forward down the slopes. Thus a decided aid is given to the slow, gravitational drift of rock debris from higher to lower parts.

Description of the Processes.

In sub-arid south-central Western Australia there is a widespread tendency to form hard caps at the surface, owing to water being drawn there by capillary attraction, and to evaporation then taking place with deposition of the contained salts.

Soils are no exception to this process, although the cap is in places but a mere film of slightly firmer material than that below. This film, however, is quite sufficient to influence the transporting action of the rain. On many gentle soil-covered slopes, especially

those covered by a sandy loam, the rain passes over the film in thin sheets or rills without furrowing the ground, despite the latter having many spaces bare of vegetation. Where the film becomes broken by any means, miniature waterfalls occur, due to the flow of water over the film to the softer soil beneath. Tiny cliffs are thus formed.

These tiny cliffs may be only from an inch to six inches in height, but they may extend laterally—that is, approximately at right angles to the direction of water-flow—for many yards, and thus form a miniature soil terrace on the slope. Other similar terraces may form above and below; and thus on a gentle slope several such terraces may be seen rising one above another, separated by varying distances, but usually fairly close together.

The actual outline of a terrace (see Plate II., Fig. 1) may be described as a series of gentle curves or scallops, mostly concave to the ground at the foot of the "cliffs," and each curve usually presents a minutely crenulated edge. This appearance suggests some force that has gently clawed away the soil, and hence the writer terms the rain action "clawing," Tiny furrows may run from the "clawed" edges, indicating the directions of the minute rills. These furrows usually tend to unite within a few feet from the edges into a larger one, but within a few more feet this larger furrow dies out, owing to the action of the water in depositing the transported fine sand and soil as a series of minute, flat alluvial fans or "lobes." The surface of the lower ground by reason of such deposit becomes levelled off, thus illustrating, on a very small scale, one result of rain action in this country. Another general result is the slow transportation by rain of soil from higher to lower ground.

Extensive areas of rock fragments slowly drifting from higher to lower ground form one of the commonest surface features in sub-arid south-central Western Australia; but only the most resistant rocks, such as quartz, jasper and ironstone, travel any distance. On the soil-covered terraces, such loose pieces of rock often occur; and, as "clawing" proceeds, these fragments are seen in course of being undermined. Eventually they topple over to the lower level, and by repetition of this process their migration down the slope is largely accomplished.